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ANNUAL REPORT
OF THE
CHIEF SIGNAL OFFICER
—
1908



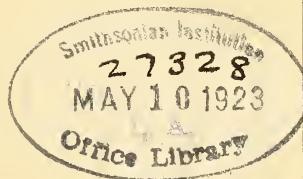


ANNUAL REPORTS, WAR DEPARTMENT
FISCAL YEAR ENDED JUNE 30, 1908

REPORT OF THE
CHIEF SIGNAL OFFICER
U. S. ARMY

TO THE SECRETARY OF WAR

1908



WASHINGTON
GOVERNMENT PRINTING OFFICE
1908

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REPORT
OF THE
CHIEF SIGNAL OFFICER OF THE ARMY.

WAR DEPARTMENT,
OFFICE OF THE CHIEF SIGNAL OFFICER,
Washington, June 30, 1908.

SIR: In submitting the annual report of the Signal Corps of the Army for the fiscal year ending June 30, 1908, it will be convenient to consider the various duties performed under the following general heads:

- I. Signal troops for the mobile army.
- II. Telegraph and cable systems for Alaska, the Philippine Islands, Cuba, and operations in the United States.
- III. Standard fire-control installations for coast defense.
- IV. Wireless telegraphy and telephony.
- V. Military aeronautics.

The various duties of the Signal Corps prescribed by law have been successfully performed during the current year. Efforts have been continued in the organization of field companies of signal troops for special service with the mobile army. Military telegraph and cable lines and wireless stations have been maintained in the Philippine Islands, Alaska, Cuba, and the United States. The signal corps posts, where are located the schools of instruction for enlisted men and also general supply depots for the Signal Corps, have been operated in an efficient manner. Progress in the installation of the standard fire-control systems for coast defense has been satisfactory. The development of wireless telegraphy for coast defense, for the mobile army, and as a part of the fixed telegraph and cable systems operated by the Signal Corps has been continued. Experiments and tests with wireless telephony have been undertaken with a view to determine its practical use in the different branches of signal corps work. Substantial progress has been made in the subject of military aeronautics, and plans for this new and highly important branch of military work have been formulated, the realization of which must await the action of Congress to provide the necessary funds and personnel.

I. SIGNAL TROOPS FOR THE MOBILE ARMY.

The present strength of the Signal Corps of the Army has made it impossible to make any adequate provision for the indispensable service of lines of information for the mobile army. In the last annual report the urgent necessities of the case were reported to the War Department, and, with the approval of the Secretary of War, the Lieutenant-General of the army, and the Chief of Staff, proposed legislation to increase the efficiency of the Signal Corps was formulated and is now before Congress for its consideration.

The provisions of this legislation are the result of careful consideration from all available sources of the present needs of the mobile army of the United States, as well as the various technical and special duties at present required of the Signal Corps by law. This office again presents the urgency of this needed legislative relief, and renews the recommendations embodied in this bill, which provides that the Signal Corps shall consist of—

One chief signal officer, with the rank of brigadier-general, four colonels, four lieutenant-colonels, twelve majors, thirty-six captains, thirty-six first lieutenants, thirty-six second lieutenants, one hundred master signal electricians, three hundred first-class sergeants, three hundred sergeants, three hundred corporals, one thousand two hundred first-class privates, three hundred privates, sixty cooks, forty-eight farriers and blacksmiths, twenty-four saddlers, twenty-four wagoners, forty-eight trumpeters, and one band, as now authorized by law for bands of cavalry regiments, and each grade shall receive the rank, pay, and allowances as now provided by law: *Provided*, That the Chief Signal Officer of the Army shall be appointed as now provided by law, and vacancies thus created shall be filled, first, by the promotion of officers holding permanent appointments in the Signal Corps according to seniority, after the examination now required by law, and, second, by details to the Signal Corps from the Army at large from the grade in which the vacancy exists or the grade below: *Provided*, That officers so detailed in the grades below that of major shall not be again eligible for such detail until they shall have served for at least one year away from that corps: *Provided further*, That the Signal Corps of the Army shall be organized as may be directed by the President of the United States, and the officers and enlisted men assigned to duty with troops shall, when so specially designated by the President, constitute a part of the line of the Army.

Until Congress takes some action to increase the number of officers and men of the Signal Corps, the mobile army of the United States must remain vitally weak in a service where it should be strongest.

The extended terrane at present involved in military operations, and the great range at which modern weapons kill, makes the supreme commander of an army in the field practically helpless in controlling the units of his force without the most perfect lines of information connecting him with the different units of his army and following him and them at all times during active military operations in campaign.

The existing three combatant arms of the service, namely, infantry, cavalry, and artillery are fundamentally designed to act cooperatively with one another to produce the maximum result in combat. It is evident that with the great terrane involved in a modern battle and the large number of troops engaged, the whole cooperative plan of the three combatant arms must surely fail without the presence of highly trained signal troops, which places in the hands of the supreme commander the only known means at present of securing accurate command of his army from hour to hour.

Military lines of information not only serve as a means of obtaining the information upon which the movements are based, but which is of equal importance, furnish the only means of actually utilizing this information in controlling and operating the units of an army as one gigantic whole.

During the current year there have been organized two field companies of signal troops, namely, Company D, stationed at Fort Omaha, Nebr., and Company E, stationed at the Presidio of San Francisco, Cal. These two companies are supplemented by Company I, stationed in Cuba, and Company A, on duty under the commandant

DSI

of the army-service schools, Fort Leavenworth, Kans. These four companies consist of approximately 75 men each and are based upon the model developed at the Army Signal School for special service in furnishing tactical lines of information in campaign.

ORGANIZATION OF FIELD COMPANIES.

The organization of field companies and the allowance of transportation for the same was authorized by the Acting Secretary of War, September 16, 1907, and announced in Circular No. 7, Signal Office, October 11, 1907, as follows:

Field company.—One captain; 3 lieutenants; 3 master signal electricians; 10 sergeants, first-class; 10 sergeants; 10 corporals; 45 privates, first-class; 20 privates; 2 cooks. Total enlisted, 100.

The allowance of transportation for such a company in time of war is 90 riding horses; 6 reel carts, 2 draft horses each; 3 instrument wagons, 4 mules each; 2 escort wagons (general transportation), 4 mules each; 9 pack mules.

Due to shortage of both officers and men at present, each of the companies thus far organized consist of about 75 enlisted men and 3 officers (1 captain and 2 lieutenants), and the allowance of animals is about 60 horses and 25 mules.

A field signal company is to provide lines of information for tactical use during combat, maneuvers, rapid marches, etc. Each field company is provided with suitable equipment to furnish tactical lines of information by visual signaling, wireless telegraphy, buzzer and other field telegraph and telephone lines. The amount of equipment is sufficient for a field company to construct, operate, and maintain 40 miles of field lines, 30 miles of buzzer lines, 2 portable wireless telegraph stations having a normal radius of 20 miles, and 6 visual signaling stations.

As stated above, with the present entirely inadequate strength of the Signal Corps, both in officers and men, it has been possible to provide only 3 field companies of signal corps troops for the United States, and such was the demand for these troops during the current summer that it became necessary, at considerable extra expense to the Government, to send these companies from one camp to another in order that some signal service might be provided, there being less than half as many field signal companies in the United States as there were maneuver camps. There is to-day not a single field company anywhere available in the United States east of the Missouri River, and in case the mobile force was required for service but 3 such companies could be produced.

Progress in the development of the technical vehicles required in this work has been made, and each of these companies is at present a mounted organization.

These 3 field companies stationed in the United States were assigned to duty at the maneuver camps held during the current summer as follows: Company A at camps at Chickamauga Park, Ga., Fort D. A. Russell, Wyo., and Fort Riley, Kans.; Company D at camps at Leon Springs, Tex., and Fort Benjamin Harrison, Ind.; Company E at camps at American Lake, Wash., and Atascadero, Cal.

The maneuver camp at Pine Plains, N. Y., was totally without any signal service in connection with any of the problems of the camp.

The value of lines of information for a mobile army increases very rapidly as the distance increases. For a military message to be transmitted 20 miles and its delivery acknowledged, electricity is so far superior to any other known agency as to make its use imperative. For this reason the indispensable service of signal troops with an army is made more and more apparent as the problem involves larger units and a greater terrane. On this account the Signal Corps requires for its proper training in peace military problems and maneuvers involving distances of from 5 to 200 miles, and its use in small problems such as can be carried out at an army post does not furnish any adequate idea of its military importance when the army is organized into brigades, divisions, and corps for active operations.

PROPOSED GRAND MANEUVERS CONDUCTED BY MILITARY LINES OF INFORMATION.

The present system of military education, both for the Regular Army and the organized militia, does not provide for the adequate instruction of officers of high rank, and such officers comprise the very class, both in the Regular Army and the organized militia, which in the event of war would be placed in command. It is highly important, therefore, that this class of officers should be provided, if possible, with better opportunities for practical instruction than at present obtain.

It can hardly be expected that Congress will make appropriations for maneuvers on a sufficiently large scale to give general officers scope for practice in actual command in time of peace, except at intervals of several years. It is believed, therefore, that an important feature of military instruction particularly adapted to officers of high rank can be obtained by means of telegraphic maneuvers without troops.

In conducting such maneuvers the general plan would be similar to the present method of conducting the war game, except that the officers engaged would occupy their real positions in the terrane and be required to make their estimates of the situation, disposition of troops, and issue orders, etc., from actual study and observation in the terrane itself. The troops of the line involved would be imaginary, while the headquarters of corps, divisions, and brigades would be real and in their relative positions in the terrane throughout the progressive problem involving concentration, strategic marches, contact, and combat.

In such a progressive problem the only real troops required would be such field companies of signal troops as are available for furnishing the tactical lines of information, the strategical lines being lines leased from commercial companies for the period of the maneuvers, as would be done in case of war.

Such maneuvers could be carried out with comparatively small expense in the different States with the organized militia or the national guard, and also by the different department commanders in their own departments.

THE DEVELOPMENT OF SIGNAL TROOPS IN THE ORGANIZED MILITIA.

The passage of the militia bill of January 21, 1903, with its subsequent amendments, has already accomplished much in the develop-

ment of the organized militia, and it is recognized that in case of war with a first-class power the Signal Service will be obliged to depend largely upon the organized militia. The act of Congress approved May 27, 1908, requires that on and after January 21, 1910, the organization, armament, and discipline of the organized militia shall be the same as that prescribed for the Regular Army. To this end the signal office has initiated steps through the division of militia affairs looking to the encouragement in every possible way of the service of tactical lines of information in the national guard. At the present moment this service in the organized militia is far from satisfactory. In some of the larger States which have well-organized militia there is either an entirely inadequate signal service or none at all.

Statement showing organizations of Signal Corps, Organized Militia, as reported by officers of the army who made the 1908 inspection under section 14 of the militia law of January 21, 1903.

State or Territory.	Organization: Company or detachment.	Station.	Commissioned officers.	Enlisted men.
Alabama				
Alaska				
Arizona				
Arkansas	Staff Corps.	Little Rock	2	
California	First Company (Second Company)	Los Angeles San Francisco	3 2	33 16
Colorado	Detachment	Denver	1	10
Connecticut	First Company	Hartford	4	54
Delaware				
District of Columbia	Corps	Washington	1	17
Florida	Staff Corps.	St. Augustine	1	
Georgia				
Hawaii	First Company	Honolulu	2	38
Idaho				
Illinois	Corps	Chicago	3	49
Indiana	do	Indianapolis	4	38
Iowa	Staff Corps.	Des Moines	1	
Kansas	Corps	Wellington	2	13
Kentucky				
Louisiana	Corps	New Orleans	5	67
Maine				
Maryland				
Massachusetts	Corps	Boston	4	54
Michigan	do	Lansing	5	85
Minnesota				
Mississippi	Staff Corps.	Jackson	2	
Missouri	Company A	Jefferson City	1	22
Montana				
Nebraska	Corps	Lincoln	3	54
Nevada				
New Hampshire				
New Jersey	Corps	Jersey City	3	56
New Mexico	do	Roswell	1	15
New York	First Company (Second Company)	New York Brooklyn	3 3	89 72
North Carolina				
North Dakota				
Ohio	First Company (Second Company)	Toledo Columbus Blackwell	3 2 3	47 37 36
Oklahoma	Corps			
Oregon				
Pennsylvania				
Rhode Island	Corps	Providence	2	17
South Carolina				
South Dakota				
Tennessee				
Texas	Company A	Brenham	3	26
Utah	Corps	Salt Lake City	2	14
Vermont	do	Northfield	4	41
Virginia				
Washington	Company A	Seattle	1	35
West Virginia				
Wisconsin				
Wyoming				
Total			76	1,035

It appears from the foregoing table that the following States and Territories have no organized signal corps troops: Alabama, Alaska, Arizona, Delaware, Georgia, Idaho, Kentucky, Maine, Maryland, Minnesota, Montana, Nevada, New Hampshire, North Carolina, North Dakota, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Virginia, West Virginia, Wisconsin, Wyoming; that the total strength of signal corps troops in the entire organized militia is 76 commissioned officers and 1,035 enlisted men, or about 1 per cent of the total organized militia.

The signal companies already organized in the different States have no uniform equipment or system of training, but this should not be understood as placing the fault upon the organizations themselves or the state authorities. As a rule the signal troops in the States comprise some of the most energetic, intelligent, and efficient of the men of the national guard. They are usually men of a higher order of intelligence, such as telegraph operators, train dispatchers, practical electrical engineers, etc., and under proper training are capable of being molded into high class and efficient signal companies and battalions. In this development it is proper that the signal service of the Regular Army should serve as a guide, and the equipment and training should as far as possible be uniform throughout the militia with that of the Regular Army.

The dependence which the country must place upon the organized militia for signal troops in case of war, as well as for other branches of the military service, is well recognized. The real military needs of the country at present involve some radical changes in our military policy, and it should be the duty of the War Department frankly to place the facts before Congress in a conservative and careful manner in order that the country may not be uninformed as to the real military situation.

Due to our geographic position, it is considered impossible for any nation at present to land and maintain in the United States a force greater than 250,000 combatants until it has established absolute command of the sea. On this assumption there would seem to be no reason for the United States having available for its first line a greater force than 450,000 combatants. Of this number at least one-third should be available at once to meet a sudden attack at a threatened point. This evidently would require a regular army subject to immediate expansion to 150,000 men, and would require an organized militia of 300,000 men under the call of the executive for federal service.

In regard to the proportion of the different arms which should compose this force, there is little accurate data available concerning signal troops. A careful study of the composition of the different armies of the world, particularly those of Germany, France, Japan, and England, furnishes a fairly accurate guide as to the relative proportions of different arms for infantry, cavalry, and field artillery, but does not furnish reliable data for the proportion of these troops which should constitute the service of lines of information. The reason for this is that in every other army of the world this service of information, corresponding to the Signal Corps of the American army, is performed as a part of the function of some other department. The American army is the only army which has recognized the tactical and strategical importance of this service and has

placed it under a separate corps. The wisdom of this action is being clearly demonstrated at the present time, and England in particular at this moment is pointing out the superiority of the American idea in this respect and urging upon its authorities the following in our footsteps. From the above fact it has been impossible up to the present to determine from a study of these armies just what proportion constitutes the service of the Signal Corps for the mobile army. From the experience gained in our own service and from such information as can be obtained from foreign armies, it is believed that a conservative estimate is $2\frac{1}{2}$ per cent of the combatant force as the minimum which can be safely used for the service of lines of information for the mobile army. This would be approximately 3 per cent of the infantry command, which, perhaps, is a better basis to start from than the $2\frac{1}{2}$ per cent of the total force.

From the above general statement of what is believed to be the safe military needs of our country at present, it is readily seen what reliance must be placed upon the organized militia or national guard. On the basis of $2\frac{1}{2}$ per cent, it appears that no less than 7,500 signal corps troops should be ultimately provided in the national guard to adequately meet the military situation as it exists at present. Realizing the need of this indispensable service for any army which is to operate in campaign, the Signal Office has recently taken steps to encourage in every possible way the authorization of signal troops in each of the different States, and their equipment and training along the lines of such troops in the Regular Army.

II. TELEGRAPH AND CABLE SYSTEMS AND OPERATIONS IN THE UNITED STATES.

ALASKA.

The Washington-Alaska military cable and telegraph system continued to work satisfactorily during the year, barring interruptions incident to storms, forest fires, flood, and ice. The most serious interruptions and those which resulted in the greatest delays were due to forest fires in the vicinity of Fort Gibbon. It will probably be necessary to rebuild many miles of line in the burned district.

The system consists of 2,524 miles of submarine cable, 1,403 miles of land lines, and 879 miles of wireless, there having been an increase in wireless of 772 miles. The cable system remains the same as at the date of my last annual report—namely, the main line from Seattle to Sitka, Sitka to Valdez, Valdez to Seward, with branch lines from Sitka to Juneau, Valdez to Liscum, Juneau to Haines Mission, Haines Mission to Skagway, Cape Fanshaw to Wrangell, Wrangell to Hadley, and Hadley to Ketchikan. Land lines connect with the cable system at Valdez and extend from that point to Fort Egbert and St. Michael, and by wireless from St. Michael to Safety and Nome.

ADMINISTRATION.

The system has been under the direction of the chief signal officer, department of the Columbia, at Seattle, Wash.

For purposes of administration and supply the system is divided into four sections, with officers of the Signal Corps conducting these administrative functions. The lines between Valdez and Fort Egbert

and to Paxson comprise the first and second sections; those from Paxson to the Tanana, down that river to the Yukon, and thence to Kaltag, the third section; and those west of Kaltag the fourth section.

Stations and distances.

	Interme- diate.	Total.		Interme- diate.	Total.	
LAND LIN. S.						
<i>Nome—Valdez Station.</i>			<i>LAND LINES—continued.</i>			
	<i>Miles.</i>	<i>Miles.</i>				
Nome	0	0	<i>Fort Egbert branch—Cont'd.</i>			
Fort Davis	4	4	North Fork	19	1,422	
Safety	20	24	Fort Egbert	68	1,490	
St. Michael (wireless)	107	131	Boundary	12	1,502	
Golsova	35	166				
Unalakleet	30	196	CABLES.			
Old Woman	50	246	<i>Seattle—Seward.</i>			
Kaltag	45	291	Seattle	0	0	
Nulato	40	331	Sitka	1,085	1,085	
Koyukuk	30	361	Valdez	599	1,684	
Louden	50	411	Fort Lisicum	4	1,688	
Melozl	35	446	Seward	189	1,877	
Kokrines	38	484	Montague Island - Cordova- Cape Whitshed	68	1,945	
Birches	40	524				
Fort Gibbon	55	579	<i>Sitka-Skagway.</i>			
Rapids	24	608	Sitka	0	1,945	
Rampart	23	626	Cape Fanshaw (no station)	211	2,156	
Glen	35	661	Juneau	98	2,254	
Hot Springs	21	682	Haines Mission	106	2,360	
Tolovana	37	719	Skagway	18	2,378	
Minto	39	758				
Nenana	35	788	<i>Cape Fanshaw-Ketchikan.</i>			
Chena	29	822	Cape Fanshaw (no station)	0	2,378	
Fairbanks	10	832	Wrangell	63	2,441	
Salcha	37	869	Hadley	69	2,510	
Delta	29	898	Ketchikan	28	2,538	
Richardson	2	900				
McCarty	20	920	<i>Lauton-Worden.</i>			
Donnelly	40	960	Fort Lauton	0	2,538	
McCallum	37	997	Fort Worden	42	2,580	
Paxson	18	1,015				
Hogan	29	1,044	<i>Ward-Lauton.</i>			
Gulkana	37	1,081	Fort Ward	0	2,580	
Copper Center	26	1,107	Fort Lauton	12	2,592	
Tomsina	25	1,132				
Teikhell	24	1,156	WIRELESS.			
Saina	24	1,180	Egbert-Circle	162		
Thompson Pass	5	1,185	Circle-Fairbanks	180		
Wortmans	7	1,192	Fairbanks-Gibson	150		
Valdez	19	1,211	Gibson-Nome	390		
			Nome-St. Michael	131		
			Petersburg-Wrangle ¹	49		
			Total,		1,062	

RECAPITULATION.

	Miles.
Land lines	1,395
Wireless	1,062
Cables	2,592
	5,049

There are 52 telegraph offices and 12 cable offices in this system, of which 20 are money-transfer offices. During the year the total number of messages handled was 96,521 commercial and 37,891 official.

The line receipts amounted to \$206,888.85 "this line," \$22,937 "other lines," and government business was handled to the value of \$144,641.12. The largest amount of business done in any one month during the year was in August, 1907, when the receipts were \$25,497.

EXTENSIONS AND BETTERMENTS.

CABLES.

The changes, repairs, additions, etc., to the cable system are described under the heading "cable ship *Burnside*."

LAND LINES.

The Gakona-Delta cut-off, commenced January 9, 1907, was completed September 5, 1907, permitting abandonment of the North Fork-McCarty line soon afterwards. Rebuilding and placing a second wire on the line between Valdez and Gulkana was begun April 25, 1908, and it is expected that the extension of this second wire to McCarty will be finished before the end of the present year.

Detail statement of expenditures under army appropriation act approved March 2, 1907.

Appropriation-----	\$190, 000. 00
Expended :	
Wireless installations -----	\$60, 552. 35
Land lines-----	29, 416. 03
Cable system -----	65, 163. 23
Total expenditures-----	155, 131. 61
Unexpended balance-----	34, 868. 39

The army appropriation act approved May 11, 1908, provides that of the receipts of the Washington-Alaska military cable and telegraph system that has been covered into the Treasury of the United States the sum of \$200,000 is appropriated and made available for defraying the cost of such extensions and betterments of the system as may be approved by the Secretary of War.

CABLE SHIP BURNSIDE.

The *Burnside*, early in August, 1907, proceeded to Alaskan waters for the purpose of making necessary repairs and performing other work in connection with the cable system. After removing a fault in the Valdez-Sitka cable August 23, a survey was made of Montague Island with a view of locating a landing place for the branch to Cordova. The cable ship then proceeded to Sitka and there connected the naval wireless station on Japonski Island with the cable office at Sitka; sailed for Juneau, and en route to that point relocated the cable off the southern end of Douglas Island; from Juneau proceeded to Cape Fanshaw and made repairs to cable house there; surveyed waters in the vicinity of Petersburg with a view to landing cable. September 28 the *Burnside* proceeded under telegraphic instructions to Valdez with the governor of Alaska. Upon notification of interruption of the Valdez-Sitka cable the vessel proceeded to sea October 2. The fault was located about 170 miles from Sitka, and communication was restored on the 7th. Repairs were made to the cable landings at Fort William H. Seward, Wrangell, Hadley, and Ketchikan; returned to Puget Sound October 30, and proceeded with the relaying of the Fort Lawton-Fort Flagler cable. Upon comple-

tion of this work the ship proceeded to Tacoma, Wash., and loaded new cable, returning to Seattle and remaining there until February 17, 1908. The *Burnside* then proceeded to Valdez to remove a fault in the Valdez-Sitka cable, and also repaired the Valdez-Seward cable. While undergoing repairs at Tacoma, interruption was reported in the Valdez-Sitka cable and the ship was again sent to Alaskan waters, restoring communication April 11.

TELEGRAPH RESERVATIONS.

Since the last report of the Chief Signal Officer, there have been reserved and set apart for the use of the Signal Corps in the operation and maintenance of the United States military telegraph and cable lines in Alaska the following:

By order dated August 1, 1907, the military reservation at Old Woman, erroneously described by Executive order of September 21, 1905, is modified so that said reservation shall comprise all public lands, and those only, included within metes and bounds as follows:

Beginning at a spruce stump 4 feet high, located on the northeast bank of a slough of the Old Woman River, marked "I.S.U.S.M.R.;" thence true east 790 feet to a stake 4 feet high; thence true north 1,000 feet to a stake 4 feet high; thence true west 1,060 feet to a stake 4 feet high, the northwest corner of the original reservation; thence continuing true west 400 feet, more or less, to a stake; thence true south 560 feet, more or less, to a stake; thence true east 400 feet, more or less, to a stake; thence true south 440 feet, more or less, to a stake 4 feet high, the southwest corner of the original reservation; thence true east 270 feet to point of beginning; containing 29.48 acres, more or less. The bearings are true; magnetic variation (1907) $19^{\circ} 30'$ east. (General Orders, No. 175, 1907.)

By order dated October 23, 1907, the following was reserved, subject to private rights:

Donnelly.—Beginning at a post on the bank of the Big Delta River, about three-quarters of a mile south of Donnelly's road house, marked "U.S.M.R.No.1"; thence south one mile to a post marked "U.S.M.R.No.2"; thence east one mile to post marked "U.S.M.R.No.3"; thence north one mile to post marked "U.S.M.R.No.4"; thence west one mile to point of beginning.

McCallum.—Beginning at a post three hundred feet east and one thousand nine hundred and fifty-six feet north of northeast corner of McCallum's road house, marked "U.S.M.R.No.1;" thence south one mile to post marked "U.S.M.R.No.2;" thence east one mile to post marked "U.S.M.R.No.3;" thence north one mile to post marked "U.S.M.R.No.4;" thence west one mile to point of beginning.

Paxson.—Station reserve: Beginning at a post one hundred and fifty-two feet north and four hundred and sixty-two feet west of northwest corner of Paxson's road house, marked "U.S.M.R.No.1;" thence east one thousand feet to post marked "U.S.M.R.No.2;" thence north one thousand feet to post marked "U.S.M.R.No.3;" thence west one thousand feet across Gulkana River to post marked "U.S.M.R.No.4;" thence south one thousand feet across Gulkana River to point of beginning.

Paxson.—Timber reserve: Beginning at a post one mile south and two thousand one hundred and twelve feet east of initial point of station reserve marked "U.S.M.R.No.1;" thence west three thousand nine hundred and sixty feet to post marked "U.S.M.R.No.2;" thence south one mile to post marked "U.S.M.R.No.3;" thence east three thousand nine hundred and sixty feet to post marked "U.S.M.R.No.4;" thence north one mile to point of beginning.

Right of way.—A strip of land one hundred feet wide (fifty feet on each side of the center of telegraph line) along the United States military telegraph line from Gulkana Station, near the mouth of the Gulkana River, to McCarty Station, near the mouth of the Big Delta River, which, owing to its length of one hundred and sixty-one miles, more or less, is necessarily unstaked.

The reservation at Central and Summit, and that portion of the right of way between Northfork and McCarty, Alaska, which were reserved for military telegraph purposes by executive order, dated May 24, 1905 (G. O. No. 83, War Department, June 5, 1905), having become useless for the purposes for which reserved, are hereby placed under the control of the Secretary of the Interior, under act of Congress approved July 5, 1884 (23 Stat. L., 103), for disposition under said act or as may be otherwise provided by law. (General Orders, No. 224, 1907.)

By order dated January 18, 1908, the following was reserved, subject to private rights:

That tract of land included within metes and bounds as follows:

Minto.—Beginning at a spruce post on the bank of the Tanana River and marked "Stake No. 1;" thence N. $18^{\circ} 60'$ E., 1,370 feet to a blazed spruce tree marked "Stake No. 2;" thence N. $72^{\circ} 00'$ W., 1,320 feet to a blazed spruce tree marked "Stake No. 3;" thence S. $18^{\circ} 00'$ W., 1,660 feet to a blazed cottonwood tree marked "Stake No. 4" on the bank of the Tanana River; thence in an easterly direction, following the meanderings of said river, approximately 1,320 feet, to "Stake No. 1," the point of beginning. Area, 45.91 acres, more or less. The bearings are true. (General Orders, No. 19, 1908.)

By order dated March 3, 1908, the following was reserved, subject to private rights:

That tract of land included within metes and bounds as follows:

Hogan.—Beginning at a point 300 feet west and 2,640 feet north of the middle point of the west wall of the telegraph station, designated by a post marked "U.S.M.R.No.1;" thence south 5,280 feet to a post marked "U.S.M.R.No.2;" thence east 5,280 feet to a post marked "U.S.M.R.No.3;" thence north 5,280 feet to a post marked "U.S.M.R.No.4;" thence west 5,280 feet to the point of beginning. Area, 640 acres, more or less. Bearings true—assuming variation of needle to be thirty-two degrees. (General Orders, No. 34, 1908.)

By order dated April 4, 1908—

The following described parcel of land situated in Sitka, Alaska, which was included in the reservations for public purposes made on the recommendation of the Secretary of the Interior, dated June 19, 1890, by executive order, dated June 21, 1890, is hereby transferred from the Navy Department to the War Department for the use of the Signal Corps, U. S. Army, as a site for a cable house and station in the operation of military cable and telegraph lines in Alaska, viz:

All that parcel of land included within metes and bounds as follows:

Commencing at low-water mark on the south side of the west end of Lincoln street; thence along the south side of said Lincoln street about 200 feet in a northeasterly direction to the northwest corner of lot occupied by United States court-house and jail building; thence in a southeasterly direction along the west fence of said lot 200 feet to low-water mark; and thence along low-water mark in a westerly and northwesterly direction to the point of beginning. (General Orders, No. 61, 1908.)

By order dated April 16, 1908, the following was reserved, subject to private rights, for a wireless telegraph station at Fairbanks, Alaska:

That tract of land included within metes and bounds as follows:

Beginning at a stake, centered with a tack, and marked "Initial Stake No. 1;" thence N. $81^{\circ} 50'$ E. 18 feet to the left bank of the Chena River at its intersection with the south line of the Independent Lumber Company's property; thence in a southerly direction following the meanderings of the left bank of the Chena River approximately 853 feet; thence S. $81^{\circ} 50'$ W. 16 feet to a stake, centered with a tack, and marked "Stake No. 2;" thence S. $81^{\circ} 50'$ W. 1,100 feet to a stake, centered with a tack, and marked "Stake No. 3;" thence N. $8^{\circ} 10'$ W. 850 feet to a stake, centered with a tack, and marked

"Stake No. 4;" thence N. $81^{\circ} 50'$ E. 982 feet to initial stake No. 1, the point of beginning. Area, 19 acres, more or less. All courses are referred to the true meridian. (General Orders, No. 66, 1908.)

By order dated May 4, 1908, the following was reserved, subject to private rights:

1. *Kaltag* (Lat. $64^{\circ} 15'$ N.; long. $158^{\circ} 40'$ W.).—Beginning at a stake on the bank of the Yukon River and marked "Stake No. 1," N. $58^{\circ} 00'$ W. 618 feet to a stake marked "Stake No. 2;" thence N. $32^{\circ} 00'$ E. 195 feet to a stake marked "Stake No. 3;" thence S. $58^{\circ} 00'$ E. 618 feet to a stake on the bank of the Yukon River and marked "Stake No. 4;" thence in a southerly direction approximately 195 feet, following the meanderings of the bank of the Yukon River to Stake No. 1, the point of beginning. Area, 2.763 acres, more or less. The bearings are true.

2. *Nulato* (Lat. $64^{\circ} 42'$ N.; long. $158^{\circ} 00'$ W.).—Beginning at a stake on the bank of the Yukon River and marked "Stake No. 1," following the meanderings of the bank of the Yukon River in an easterly direction to a stake on the bank of the Yukon River and marked "Stake No. 2;" thence due north 325 feet to a stake marked "Stake No. 3;" thence due west 110 feet to a stake marked "Stake No. 4;" thence due south, following the eastern line of the Catholic Mission homestead, 325 feet to Stake No. 1, the point of beginning. Area, 0.821 acre, more or less. The bearings are true.

3. *Koyukuk* (Lat. $64^{\circ} 54'$ N.; long. $157^{\circ} 30'$ W.).—Beginning at a stake on the bank of the Yukon River and marked "Stake No. 1," N. $10^{\circ} 00'$ W. 1,000 feet to a stake marked "Stake No. 2;" thence S. $80^{\circ} 00'$ W. 1,000 feet to a stake marked "Stake No. 3;" thence S. $10^{\circ} 00'$ E. 1,000 feet to a stake on the bank of the Yukon River and marked "Stake No. 4;" thence following the meanderings of the bank of the Yukon River in an easterly direction approximately 1,000 feet to Stake No. 1, the point of beginning. Area, 22.956 acres, more or less. The bearings are true.

4. *Louden* (Lat. $64^{\circ} 37'$ N.; long. $156^{\circ} 25'$ W.).—Beginning at a stake at the top of the bank of the Yukon River and marked "Stake No. 1," due north 1,000 feet to a stake marked "Stake No. 2;" thence due west 1,000 feet to a stake marked "Stake No. 3;" thence due south 1,000 feet to a stake marked "Stake No. 4;" and located at the top of the bank of the Yukon River; thence following the meanderings of the bank of the Yukon River in an easterly direction approximately 1,000 feet to Stake No. 1, the point of beginning. Area, 22.956 acres, more or less. The bearings are true.

5. *Meloz* (Lat. $64^{\circ} 44'$ N.; long. $155^{\circ} 28'$ W.).—Beginning at a stake on the bank of the Yukon River and marked "Stake No. 1," following the meanderings of said bank in an easterly direction approximately 1,000 feet to a stake on the bank of the Yukon River marked "Stake No. 2;" thence N. $32^{\circ} 00'$ E. 1,000 feet to a stake marked "Stake No. 3;" thence S. $82^{\circ} 00'$ W. 1,000 feet to a stake marked "Stake No. 4;" thence S. $32^{\circ} 00'$ W. 1,000 feet to Stake No. 1, the point of beginning. Area, 18.319 acres, more or less. The bearings are true.

6. *Kokrines* (Lat. $64^{\circ} 53'$ N.; long. $154^{\circ} 30'$ W.).—Beginning at a stake on the bank of the Yukon River at high-water mark and marked "Stake No. 1," N. $2^{\circ} 00'$ E. 600 feet to a stake marked "Stake No. 2;" thence S. $88^{\circ} 00'$ E. 600 feet to a stake marked "Stake No. 3;" thence S. $2^{\circ} 00'$ W. 600 feet to a stake on the bank of the Yukon River marked "Stake No. 4;" thence in a westerly direction following the meanderings of the bank of the Yukon River to Stake No. 1, the point of beginning. Area, 8.262 acres, more or less. The bearings are true.

7. *Birches* (Lat. $65^{\circ} 06'$ N.; long. $53^{\circ} 15'$ W.).—Beginning at a stake on the bank of the Yukon River and marked "Stake No. 1," following the meanderings of the bank of the Yukon River in an easterly direction to another stake on the bank of the Yukon River and marked "Stake No. 2," approximately 1,000 feet; thence N. $28^{\circ} 00'$ W. 1,000 feet to a stake marked "Stake No. 3;" thence S. $62^{\circ} 00'$ W. 1,000 feet to a stake marked "Stake No. 4;" thence S. $28^{\circ} 00'$ E. 1,000 feet to Stake No. 1, the point of beginning. Area, 22.956 acres, more or less. The bearings are true.

8. *Rapids* (Lat. $65^{\circ} 16'$ N.; long. $150^{\circ} 45'$ W.).—Beginning at a stake at the top of the bank of the Yukon River and marked "Stake No. 1," N. $12^{\circ} 00'$ W. 1,000 feet to a stake marked "Stake No. 3;" thence S. $54^{\circ} 00'$ W. 1,000 feet to a stake marked "Stake No. 3;" thence S. $12^{\circ} 00'$ E. 1,000 feet to a stake at the top of the bank of the Yukon River and marked "Stake No. 4;" thence following the meanderings of the bank of the Yukon River in an easterly direction ap-

proximately 1,000 feet to Stake No. 1, the point of beginning. Area, 21.235 acres, more or less. The bearings are true.

9. *Hot Springs* (Lat. $64^{\circ} 58' N.$; long. $151^{\circ} 10' W.$).—Beginning at a stake at the top of the bank of a slough of the Tanana River; said stake being located on the western boundary line of the homestead of J. M. Hall, and marked "Stake No. 1;" thence in a westerly direction, following the meanderings of the bank of the above-mentioned slough, approximately 1,320 feet to a stake on the bank of the said slough, and marked "Stake No. 2;" thence S. $10^{\circ} 00' W.$ 1,320 feet to a stake marked "Stake No. 3;" thence S. $80^{\circ} 00' E.$ 1,320 feet to a stake marked "Stake No. 4;" and located on the western boundary line of the homestead of J. M. Hall; thence N. $10^{\circ} 00' E.$ 1,320 feet, following the western boundary line of the said homestead, to Stake No. 1, the point of beginning. Area, 40 acres, more or less. The bearings are true.

10. *Tolovana* (Lat. $64^{\circ} 50' N.$; long. $149^{\circ} 55' W.$).—Beginning at a cottonwood post on the bank of the Tanana River which marks an upper corner of the homestead of J. C. Riley, and marked "Stake No. 1," N. $38^{\circ} 00' W.$, following the line of the said homestead 325 feet to a cottonwood stump, which marks an angle of said homestead, and marked "Stake No. 2;" thence N. $52^{\circ} 00' E.$ following the line of said homestead, 1,320 feet to a spruce stump, which marks a corner of said homestead, and marked "Stake No. 3;" thence S. $38^{\circ} 00' E.$ 325 feet to a cottonwood stump marked "Stake No. 4;" thence following the meanderings of the bank of the Tanana River in a westerly direction approximately 1,320 feet to Stake No. 1, the point of beginning. Area, 9.848 acres, more or less. The bearings are true.

11. *Nenana* (Lat. $64^{\circ} 40' N.$; long. $148^{\circ} 30' W.$).—Beginning at a square blazed pine tree on the top of the bank of the Tanana River and marked "Stake No. 1," N. $32^{\circ} 00' E.$ 1,500 feet to a square blazed tree marked "Stake No. 2;" thence N. $58^{\circ} 00' W.$ 1,500 feet to a square blazed tree marked "Stake No. 3;" thence S. $32^{\circ} 00' W.$ 1,500 feet to a square blazed stump on the top of the bank of the Tanana River and marked "Stake No. 4;" thence in an easterly direction, following the meanderings of the bank of the Tanana River, approximately 1,500 feet to Stake No. 1, the point of beginning. Area, 51.652 acres, more or less. The bearings are true.

12. *Salcha* (Lat. $64^{\circ} 33' N.$; long. $147^{\circ} 15' W.$).—Beginning at a stake marked "Stake No. 1," S. $12^{\circ} 00' E.$ 2,600 feet to a stake marked "Stake No. 2;" thence N. $78^{\circ} 00' E.$ 3,400 feet to a stake marked "Stake No. 3;" thence N. $12^{\circ} 00' W.$ 2,600 feet to a stake marked "Stake No. 4;" thence S. $78^{\circ} 00' W.$ 3,400 feet to Stake No. 1, the point of beginning. Area, 202.938 acres, more or less. The bearings are true.

13. *Delta* (Lat. $64^{\circ} 20' N.$; long. $146^{\circ} 50' W.$).—Beginning at a blazed tree on the bank of a slough of the Tanana River and marked "Stake No. 1," which slough is within the limit of high-water mark of said river, following the meanderings of the bank of this slough in an easterly direction approximately 800 feet to a blazed tree marked "Stake No. 2;" thence S. $28^{\circ} 00' W.$ 5,280 feet to a blazed tree marked "Stake No. 3;" thence N. $62^{\circ} 00' W.$ 800 feet to a blazed tree marked "Stake No. 4;" thence N. $28^{\circ} 00' E.$ following the line of the eastern boundary of Delta City, 5,280 feet to Stake No. 1, the point of beginning. Area, 96.969 acres, more or less. The bearings are true.

14. *Richardson* (Lat. $64^{\circ} 20' N.$; long. $146^{\circ} 28' W.$).—Beginning at initial post marked "Stake No. 1," and which is situated on the north side of Second street in the village known as Richardson, Alaska, and about 28 feet west of the east line of the Hart-James Survey, and approximately 935 feet in an easterly direction from the crossing of Second street and the Banner Creek Trail; thence N. $68^{\circ} 00' W.$ 50 feet along the line of Second street to a post marked "Stake No. 2;" thence N. $22^{\circ} 00' E.$ 285 feet to a post marked "Stake No. 3;" and situated on the south line of the Alaskan Military Telegraph Line right of way; thence S. $68^{\circ} 00' E.$ 50 feet, following the south line of the said right of way to a post marked "Stake No. 4;" thence S. $22^{\circ} 00' W.$ 285 feet to initial Stake No. 1, the point of beginning. Area, 0.327 acre, more or less. The bearings are true. (General Orders, No. 90, 1908.)

By order dated May 16, 1908, the following was reserved, subject to private rights:

That tract of land included within metes and bounds as follows:

Chena.—Beginning at a stake 2" x 4" (Corner No. 1), located at the south-east corner of said tract, and also distant west 23.5 feet from corner of resi-

dence of H. A. Currier; thence north 200 feet to a similar stake (Corner No. 2), and also distant west 23.5 feet from the northwest corner of lot of H. A. Currier on First street; thence west 100 feet to a similar stake (Corner No. 3); thence south 200 feet to a similar stake (Corner No. 4); thence east, along Front street, 100 feet, to Corner No. 1, the point of beginning. Area, 20,000 square feet. The bearings are true. Lat. $64^{\circ} 50' N.$; long. $148^{\circ} 00' W.$ (General Orders, No. 93, 1908.)

The reservations previously set apart are described in full in the reports of the Chief Signal Officer for 1906 and 1907.

WIRELESS OPERATIONS.

In pursuance of the design to give Alaska a wireless telegraph system which would furnish an alternative to the wire lines for communication between the principal points, purchases have been made of material for 10-kilowatt stations at Nome and Fort Gibbon, and for 3-kilowatt stations at Fort Egbert, Fairbanks, and Circle City. The navy has undertaken the erection of a wireless station in Prince William Sound. There is already one naval station at Sitka. From previous experience in Alaska, it is hoped that by means of relays communication can be established between Nome and Sitka, and thence through the powerful station there to the United States direct. At each of the signal corps Alaskan stations named there is to be a structural steel tower of from 180 to 200 feet in height, and with the exception of Circle City excellent buildings are being erected for housing the apparatus and operators. The best apparatus procurable has been sent, and it is thought that before the winter season sets in the stations will be in working order.

CONDITION OF ENLISTED MEN.

Although the past winter in Alaska was milder than the preceding one, causing less suffering generally on the part of the enlisted men, a few instances have been reported where they were compelled to undergo hardships in the performance of their duties connected with the maintenance of the telegraph lines. The health and conduct of the men has, as a rule, been good, although a few cases of typhoid fever developed during the year.

The increased pay now authorized for duty in Alaska is, it is believed, a just reward for this extreme service, and there is already noticeable a desire on the part of the men for this service.

PHILIPPINE ISLANDS.

The military system of land lines, cables, and wireless stations in the Philippine Islands has been under the supervision of the chief signal officer, Philippines Division. The transfer of signal corps telegraph lines and cables to the insular government, in accordance with an agreement, the provisions of which were approved by the Secretary of War and the Philippine Commission, was completed on October 4, 1907. This transfer comprised 3,982 miles of land lines, 1,296 miles of cable, and property to the value of \$734,954.42. Previous to the transfer of the cable system it was inspected and placed in good working condition. In conformity with the agreement mentioned above, the Signal Corps is to maintain a cable ship until October, 1909.

TELEGRAPH AND CABLE SYSTEM.

The Signal Corps now operates 115 miles of military land lines, 9.6 miles of cable, and 24 offices. During the year the cable ship *Liscum* was engaged sixty-one days and ten hours in the repair and inspection of military cables, and subsequent to the completion of the transfer was employed thirty-seven days and fifteen hours in repairing insular government cables. On July 25, 1907, a cable was laid between Grande Island and Olongapo, and a telegraph office opened at the former station. Another cable was laid in Subic Bay between Grande Island and Macmanys Point on September 28, 1907, the combined length of these two cables being 9.6 statute miles. The interruptions to the Carigara-Catbalogan and the Capiz-Milagros cables were repaired by the cable crew of the *Liscum*, using for this purpose a launch and lighter. The cable ship has been in drydock since March 22, 1908, but will be available by the beginning of the next fiscal year.

From June 1, 1907, to May 31, 1908, the following messages were sent: Official business, 51,488; commercial business, 21,264; civil government business, 7,365; relayed, 226,604.

TELEPHONE SYSTEMS.

Owing to the temporary nature of most of the garrisons in the Philippine Islands, the various post telephone systems installed were temporary in character, and they now require extensive rehabilitation. The systems at Iloilo, Jolo, and Zamboanga have already been entirely reconstructed, following standard practice. The installation at Parang, Mindanao, is in course of reconstruction, and a system will soon be installed at Camp Keithley, Mindanao. The telegraph line between Cotabato and Fort Pikit, Mindanao, is being converted into a metallic-circuit telephone line, and the grounded telephone circuit between Camp Overton and Camp Keithley is being changed into a metallic one.

The military telephone system in Manila has been maintained throughout the year with an average of 75 instruments connected to the exchange, the number of calls averaging 2.2 per day per instrument. The telephone exchange at Fort William McKinley is connected with Manila by two metallic trunk lines, one going to the military central and the other to the commercial exchange, giving the military system at Fort William McKinley the advantage of commercial service in the city of Manila.

WIRELESS TELEGRAPHY.

The improvised station at the Cuartel de Infanteria was equipped as a regular station during the year, the transformer and various other parts of the apparatus having been manufactured in the signal corps shops, and the power for its operation obtained from the city lighting mains. This station has been utilized for training operators and communicating with Cavite and vessels and transports having wireless equipment. Four field wireless pack sets were sent to the Philippines for instruction purposes, and one of these sets was temporarily installed on the cable ship *Liscum*.

A wagon wireless set, received in the islands during March, 1908, was shipped to Malabang, Mindanao, and a temporary station was established to furnish communication with Zamboanga, the insular government cable between these points having been interrupted. This station is in successful operation, but transmits messages for the military establishment only, this limitation being necessarily placed on it on account of the fact that continued use of the apparatus might cause a breakdown, and there are no spare parts or opportunity for making repairs at such a distant station.

ENLISTED MEN.

The health, performance of duty, and discipline of this command have been satisfactory, there being only 1 trial by general court-martial and 18 by summary court. The strength of the corps in the Philippines has varied from 211 men at the beginning of the fiscal year to 139 at the end. Ninety-seven men have been discharged in the islands, 25 of whom reenlisted; 28 were obtained by transfer from the line and 91 by transfer from the United States.

One hundred and sixteen men have been returned to the United States during the year—44 for duty, 2 for medical treatment, and 70 for discharge, while 1 man died. Of the 139 men in the islands at the end of this fiscal year, three out of every four have been there less than one year.

CUBA.

TELEPHONE SYSTEMS.

The telephone system, operating three switchboards and about 100 telephones in Marianao, Camp Columbia, and Habana, has given efficient service throughout the year. There are two trunk lines, metallic, between the Marianao and Habana boards, and one trunk line between the Columbia and Habana boards. The Habana board is connected by trunks to the central of the Red Telefonica, which is the commercial telephone company of Habana, and to the central of the Cuban government telephone system. All connections are exchanged with these systems without charge or accounting of any kind. The trunk lines above described were rebuilt by the Signal Corps, most of the material being furnished by the Cuban Government, during the months of February and March, 1908, and are at this time in most excellent condition.

Target range telephone installations were in use at each post where troops were stationed in the island of Cuba, and so far as known they rendered all the assistance in connection with target practice that was required or desired.

The following posts are equipped with telephone installations for the transaction of their local business: Camaguey, Cardenas, Cienfuegos, Constancia, Holguin, Matanzas, Pinar del Rio, Placetas, Sagua la Grande, Santiago de Cuba, and Santo Domingo.

GUANTANAMO BAY INSTALLATION.

During the months of August and September the Signal Corps constructed at Guantanamo Bay a system of land lines and cables

connecting the following places: Cuban government telegraph station at Caimanera, naval wireless telegraph station, headquarters Guantanamo Navy-Yard, station ship *Monongahela*, Hospital Cay coaling station, navy target range at Deer Point, army reservation at Fisherman Point, light-house at Windward Point, and the battery at Conde Bluff. Owing to the temporary abandonment of that vicinity by the army, this installation has been turned over temporarily to the navy. While putting in this installation at Guantanamo Bay, the Signal Corps detachment assisted the navy by installing its target range telephone system at Deer Point.

TELEGRAPHHS.

Practically all of the land telegraph lines in the island of Cuba belong to the system operated by the Cuban Government under the director general of communications. This is the same system which was reconstructed and extended by the Signal Corps during the intervention beginning in 1898.

The Cuban government telegraph lines have given quite efficient service during the past year. There have been a good many interruptions on some of the lines, but they have been repaired very promptly. The excessive amount of rain at some seasons has made certain of the lines work very badly at times, necessitating the relaying of business at intermediate stations. At the beginning of the year signal corps operators were stationed at the following places: Caimanera, Camaguey, Camp Columbia, Ciego de Avila, Habana, Holguin, Marianao, Matanzas, Santa Clara, Santiago, Santo Domingo, Pinar del Rio, and Fisherman Point. Owing to reduction in the strength of the signal corps company, operators were withdrawn on April 27, 1908, from Matanzas and Holguin. Upon business connected with the administration of the Army of Cuban Pacification, 97,840 messages were handled during the year by signal corps operators.

CUBAN GOVERNMENT WIRELESS SYSTEM.

Pursuant to directions of the commanding general, Army of Cuban Pacification, the chief signal officer of that army acted during the past year as adviser to the department of communications in connection with the installation of a system of wireless telegraph stations being installed by the Cuban Government throughout the island under contract. The following stations have been completed, inspected by the chief signal officer, Army of Cuban Pacification, and accepted by the Cuban Government: Pinar del Rio, $2\frac{1}{2}$ kilowatt; Santa Clara, 5 kilowatt; Morro Castle, Habana, 10 kilowatt. In addition to these there is a $2\frac{1}{2}$ kilowatt station at Nueva Gerona, Isle of Pines. Three stations are under construction, namely, Camaguey, 5 kilowatt; Santiago de Cuba, 10 kilowatt; and Baracoa, 5 kilowatt.

UNITED STATES.

In addition to fire-control installations for coast defenses, military aeronautics, and electrical and other important experimental work, operations of the Signal Corps in the United States cover the management of military telegraph lines and establishment of post tele-

phone systems, the supplying of signal equipment to the army and the organized militia, the provision of fire-control and fire-direction systems for the field artillery, the enlisting and training of recruits in visual, electrical, and telephone work, and active and suitable preparations to bring the corps to a state of efficiency and preparedness for war or other emergency.

SIGNAL CORPS POSTS.

Three posts, garrisoned exclusively by signal corps troops, were maintained during the year at Fort Wood, N. Y.; Fort Omaha, Nebr., and Benicia, Cal. A school of instruction for enlisted men, and a general depot of signal corps supplies and property have been maintained at each post. The post at Benicia Barracks was abandoned April 30, 1908, the storehouse being moved to Fort Mason, Cal., and the signal corps troops to the Presidio. The depots being located in the extreme eastern, middle west, and extreme western parts of the United States have proved very useful in the prompt distribution of signal-corps supplies.

During the year a first class 3-kilowatt wireless station was installed at the Fort Omaha post, and the construction of a large balloon house and hydrogen gas plant commenced. Upon the completion of the Omaha balloon plant during the present year, that post will become the principal aeronautical station of the Signal Corps. The completed gas-generating plant will permit the shipment of compressed hydrogen gas and enable the Signal Corps to engage in aeronautical work in the middle west, an undertaking which has heretofore been impossible due to lack of facilities for obtaining or transporting the proper supply of gas.

At the Fort Wood post special attention is paid to the training of men for duty in connection with fire-control work and submarine cables. This post is the home station of the cable boat *Cyrus W. Field*, which is constantly engaged in the installation and repair of submarine cables connected with the artillery fire-control systems of the Atlantic coast.

ARMY SIGNAL SCHOOL.

During the year satisfactory reports have been received from the Army Signal School at Fort Leavenworth. Although the fundamental object of the institution is to train officers for the varied technical duties of the Signal Corps and to make research into all matters pertaining to military signaling, special attention is paid to the development of apparatus and organization necessary in the field duties of signal troops with the mobile army in the field.

The course of instruction is very practical, with only enough theory "to do the thing practically." The school includes a well equipped laboratory or workshop wherein much practical work is performed by the student officers during the winter months.

A field company of the Signal Corps properly organized and well equipped for field service is on duty with the school and has rendered excellent service in the maneuver problems and field exercises of the school. The field work of the school has developed valuable data relative to improvements in field equipment and done much to coordinate and systematize the field duties of signal troops.

SIGNALING AT WEST POINT.

Between March 30, 1908, and May 30, 1908, a detachment of 10 enlisted men were on duty at West Point where it gave demonstrations in the installation and operation of field lines, and assisted in the instruction of the cadets and enlisted men in electrical field signaling.

Concerning this duty, the acting superintendent stated on May 13, 1908:

The value of the instruction given by this detachment can not be overestimated. It is felt here that the importance of this branch of art and science of war justifies a larger place in the curriculum.

FIRE-CONTROL EQUIPMENT FOR FIELD ARTILLERY.

Probably no branch of the mobile army has a greater need for efficient electrical signaling equipment than the field artillery, due to the increasing use of indirect fire and the necessity for complete control for fire and direction when a number of batteries are operating together. Based on the plans outlined by the field-artillery board at Fort Riley, the Signal Corps now issues a standard fire-control equipment for batteries, battalions, and regiments of the field artillery.

During the year a new type of telephone, specially adapted to the needs of field artillery, has been devised and is now issued. The standard equipment has been issued to 32 batteries, 12 battalions, and 6 regimental organizations, and has given satisfactory results. During the year \$11,000 has been expended on field artillery fire-control equipment.

MILITARY DEPARTMENTS.

Under paragraph 1580, Army Regulations, department commanders are required to supplement the operations of the Signal Corps by such instruction in visual military signaling as they deem necessary for the public service. The instruction in the line of the army contemplates that each troop, battery, and company commander shall have at all times at least two available enlisted men able to exchange messages in the army and navy code at short distances by flag. As an aid thereto the Signal Corps distributes direct to each army organization a visual signaling outfit, consisting of two field glasses and two flag kits. About 75 per cent of the army has been equipped. The duties of signal officers at interior posts are now confined to only the necessary administrative work in connection with the maintenance of post telephone systems and telegraph lines.

Of the 9 departments in the United States it has been possible to supply only 5 throughout the year with a chief signal officer, viz, East, Gulf, Missouri, California, and Columbia. The duties of chief signal officer in the 4 other departments, viz, Lakes, Dakotas, Texas, and Colorado, were performed during the year by officers of the line of the army detailed as aids to department commanders.

The departments in which fire-control installations are in progress have been supplied with an officer of the Signal Corps as signal officer.

Special attention has been given to fire-control work, as stated elsewhere, in the Departments of the East, the Gulf, California, and the Columbia.

SIGNAL CORPS OF THE ORGANIZED MILITIA.

The increasing need for efficient electrical field lines of information with armies of the field has been widely felt during the past year by the organized militia of the country, and many letters have been received from various organizations of the national guard relative to the field duties and equipment of signal troops. There is evinced a growing desire among the signal companies of the organized militia for standard organization and the electrical equipment necessary to install and operate field lines. These militia organizations are, in general, composed of professional men of technical ability, and the work of some of the companies at summer camps has been highly commendable.

The Signal Corps of the Army is desirous of cooperating with all militia signal organizations with the end in view of increasing the efficiency of both and of extending the usefulness of signal troops.

As shown in the last report of the War Department, signal organizations exist in the States of California, Colorado, Connecticut, Hawaii, Illinois, Indiana, Kansas, Kentucky, Louisiana, Michigan, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Rhode Island, Vermont, Texas, Utah, Washington, and the District of Columbia.

WIRELESS TELEGRAPH WORK.

In addition to the four marine wireless sets for transport service furnished during the previous year, two other sets have been constructed in the past year and furnished for use on the transports *Kilpatrick* and *Sheridan*. Reports of the ranges attained by the first sets furnished have been very remarkable; one instance being where the transport *Thomas* was communicated with by the naval station at Sitka, Alaska, at a distance of about 2,300 miles. It is stated that there is always reasonable expectation of opening communication at a distance of 1,000 miles from shore.

The coast artillery stations at Forts Totten, H. G. Wright, Hancock, and Monroe have been completed during the year, and purchases are proceeding for the completion of a number of other stations. It has been found that these stations of 1-kilowatt power, in connection with stations of smaller power on the tugs towing targets, have been of the greatest value in expediting target practice.

The 3-kilowatt station at Fort Omaha has been completed, and is a model station in its equipment. The apparatus is installed in an excellent building near the base of a 180-foot steel tower. Fort Leavenworth and Fort Riley, Kans., have each been provided with portable 1-kilowatt sets, and arrangements have been concluded for the supply at the two latter stations of 3-kilowatt sets and steel towers similar to that at Fort Omaha.

SIGNAL TROOPS IN MANEUVERS.

During the month of August, Company A, Signal Corps, participated in the summer maneuvers of the Iowa National Guard near Des Moines, Iowa. At these maneuvers, the "central station" system of umpiring was tried for the first time with troops of the organized militia. Trained umpires from the Army Staff College were in attendance, and the various umpires were kept in communication with the chief umpire by means of field lines provided by Company A, Signal Corps. The Chief Umpire was thereby kept in constant communication with all parts of the maneuver field and received simultaneous reports from both sides, enabling him to render decisions more quickly and efficiently.

Of the use of signal troops, the report of the chief umpire reads:

This one feature of umpiring serves to call attention to the growing importance of the Signal Corps. Officers have scarcely begun to realize how the methods of handling troops in the field have changed, due to this new agency. Under old conditions battles of any magnitude, once begun, were fought out by individual impulses here and there, the will of the commander exercising no great influence on the result. Now his orders can be instantly transmitted to all parts of his command and the whole made responsive to his single will. The nation that makes the best use of this means of transmitting information will have a tremendous advantage over its less progressive adversary, and to-day the United States leads the world.

During the months of September and October excellent and original service was performed by a trained company of the Signal Corps in field artillery fire-control work at Fort Riley, Kans. During each day's firing, the company followed the commanding officer of the troops engaged with field lines and kept him constantly in communication with his battalion commanders, thereby enabling that officer to exercise complete control over fire and direction.

MILITARY TELEGRAPH LINES IN THE UNITED STATES.

The following military telegraph lines were in operation at the end of the fiscal year:

From—	To—	Length.	Messages handled.
Huachuca, Ariz.....	Lewis Springs.....	19.0	2,612
Fort Bayard, N. Mex.....	Bayard.....	3.0	(a)
Do.....	Silver City, N. Mex.....	10.0	(a)
Holbrook, Ariz.....	Fort Apache.....	92.0	2,896
Fort Myer, Va.....	Fort Washington, Md.....	21.5	1,612
Fort Clark, Tex.....	Spofford Junction	9.5	1,715

^a No report.

No lines were discontinued during the year.

There have been collected for transmission of commercial telegrams over military lines in the United States during the fiscal year tariffs amounting to \$1,226.18. This amount has been deposited in the Treasury of the United States, as required by law. In addition thereto there has been collected and transferred to commercial companies the sum of \$10,212.08, covering tariffs for messages transmitted by such companies over their lines; a total of 98,612 messages

were handled. This does not include the messages over the Alaska system, transferred to and from commercial companies at Seattle.

In addition to these lines, 57 military posts in the United States are connected by short branches or loops to commercial telegraph lines. These short lines are operated by enlisted men. These offices collect no "This line" tolls, and therefore render no line receipts.

POST TELEPHONE SYSTEMS.

The sum of \$12,910.65 was expended during the year in telephone construction and maintenance at interior posts, 55 posts now being provided with signal-corps systems. Nine of the larger posts have been equipped with permanent modern installations, with subterranean cables in conduit, while at the remainder of the posts aerial construction is still used.

Efficient telephone service is as essential in the transaction of public business as it is in the commercial world, and it is the policy of the Signal Corps to reconstruct the interior post telephone systems and install subterranean cables at all the larger permanent posts as rapidly as funds become available. The extent of funds available has rendered it imperative to limit the number of telephones at each interior post to an allowance prescribed in General Orders 97, War Department, 1907.

The telephone systems at coast artillery posts are considered part of the defenses and are provided from special fire-control funds.

TARGET RANGES.

The standard target-range telephone systems with subterranean cable, provided for quick and efficient communication between firing points and targets, have given good satisfaction during the year. In the United States 57 posts have been provided with these standard systems. The remaining posts, having either very short or temporary ranges, have been provided with temporary aerial lines.

In addition to the standard telephone equipment mentioned above, the Signal Corps has designed an auxiliary system known as the "annunciator buzzer system" for increasing the efficiency of the standard target-range equipment. One of these systems has already been installed at Fort Niagara, N. Y. Additional sets for large and important ranges will be installed as soon as the necessary funds are available. During the year \$2,600 has been expended on target-range installations.

VISUAL SIGNALING.

Notwithstanding the increasing demand for electrical equipment for signaling and intercommunication, the Signal Corps has never underrated the value of visual signaling. It has continued to supply organizations with standard visual signaling outfits, consisting of two flag kits and two field glasses. This outfit has been issued to 634 organizations, consisting of companies of the engineer, signal corps, cavalry, infantry, artillery, and machine gun platoons.

Excellent reports have been received during the year concerning the two standard types of "day and night" field glasses issued by

the Signal Corps. The general properties of these field glasses, together with their low cost and serviceability, makes it a valuable part of the equipment furnished the army by the Signal Corps.

SIGNAL CORPS MANUALS.

There has been an increasing demand during the year for copies of signal corps manuals. The manuals are enumerated below:

- No. 2. Regulations for Military Telegraph Lines.
- No. 3. Electrical Instruments and Equipments.
- No. 4. Submarine Cables.
- No. 6. Visual Signaling.
- No. 7. General Regulations, Disbursing and Property.
- No. 8. Fire Control Equipment.

The Chief Signal Officer of the Army distributes signal corps manuals only to the officers, enlisted men, and civilian employees of the Signal Corps. Other branches of the service are supplied by the second section of the General Staff when applications through military channels are referred approved.

ESTIMATES.

Estimates for the Signal Corps are five in number: Clerical force, appropriated for in the legislative bill; signal service of the army, and Washington-Alaska military cable and telegraph system, appropriated for in the army bill; operation and maintenance of fire-control installations at coast defenses, appropriated for in the fortification bill; and military aeronautics, new.

The estimate for the clerical force is not increased. The signal service of the army is increased by the addition of estimates to cover post telephone systems at interior and coast artillery posts.

There is no increase in the estimate for operation and maintenance of fire-control installations.

The estimate for the Washington-Alaska military cable and telegraph system is decreased one-half.

ENLISTED MEN.

The enlisted force, which aggregated 1,194 on June 30, 1908, has experienced the following changes: Enlisted and reenlisted, 641, of whom 334 were recruits; deserted, 47, being 3.9 per cent of the total force; died 5, 0.4 per cent; discharged for disability 14, 1.2 per cent; discharged by purchase 40, 3.4 per cent.

The difficulty experienced in former years in securing adequate enlistments for the Signal Corps has not this year been felt. Indeed, for more than half the past fiscal year the enlisted strength of the corps was kept up, practically, to the number authorized, and in many cases it was necessary to turn away, owing to the lack of vacancies, apparently intelligent and desirable recruits.

The grade of master signal electrician, with its increased pay, has, it is believed, operated to encourage the more desirable and ambitious men to remain in the corps with the ultimate hope of reaching that grade. As has been done in former years, promotions to the grades of master signal electrician and first-class sergeant are made only

after successful technical examinations, such examinations being open only to sergeant of the Signal Corps.

DISBURSING DIVISION.

The following statement shows the volume of the work handled during the fiscal year:

Orders placed	2,025
Vouchers audited and paid	3,210
Transportation requests prepared	1,010
Letters and miscellaneous correspondence	21,330
Advertisements for proposals issued (about 8,310 copies being distributed)	1,087
Accounts current from officers handling Signal Corps funds, covering 13 appropriations, examined	305
Returns of Signal Corps property examined	1,888

There was a large number of miscellaneous papers handled in connection with the items mentioned which are not included in this statement, it being impracticable to keep an accurate record of them.

The following shows the state and disposition of appropriations aggregating \$1,222,302.17:

Title of appropriations.	Disbursed by this office.	Transferred to other officers.	Balance unexpended.	Total.
1. Signal service of the army, 1908	\$160,170.35	\$49,829.65	.....	\$210,000.00
2. Washington-Alaska military cable and telegraph system	112,315.91	42,815.70	\$34,868.39	190,000.00
3. Fire control at fortifications	410,886.98	95,870.35	191,923.20	698,680.53
4. Fire control in insular possessions	18,323.82	.....	6,676.18	23,000.00
5. Coast artillery fire-control installations	28.25	.....	.....	28.25
6. Board of Ordnance and Fortifications	3,593.39	.....	46,000.09	49,593.39
7. Encampment and maneuvers, organized militia, 1908	49,000.00	.....	.....	49,000.00
Total	754,318.70	188,515.70	279,467.77	1,222,302.17

ELECTRICAL DIVISION.

In addition to an increasing amount of routine work in providing electrical supplies and material for the Signal Corps and for the coast defense fire-control installations, the electrical division has constantly endeavored to continue during the year its investigation into all matters which would tend to simplify and improve the electrical apparatus of the Signal Corps.

In connection with the instrument shop, the division has planned and assembled wireless sets for the mobile army, for Alaska, and for army transports, all of which are giving satisfactory results. The new field set assembled in two small chests, for transportation by pack mule, promises to be the most efficient field set yet produced by the Signal Corps.

For the artillery districts, a new type of signal station has been evolved to meet the objections raised to the former two-story type. All district artillery engineers have been placed on the mailing list for engineer circulars, and each one furnished with a file of signal corps drawings and specifications. There has been instituted during the year the practice of sending each month to the coast artillery and signal officers concerned a progress map showing the rate of progress

made at each post during each month since the commencement of the work. The progress maps furnish each officer in charge of such work with a knowledge of just what is being accomplished under similar conditions in other districts, and by comparisons furnish an incentive for greater effort.

During the year about 4,000 negatives illustrative of events and places connected with the campaigns of the Spanish-American war, Philippine insurrection, and China relief expedition have been collected, from which prints have been made, mounted, and indexed, the collection making an interesting and valuable record of work of the Signal Corps as well as of the general life of the army during the operations mentioned.

TELEGRAPH DIVISION.

The telegraph division receives all reports concerning the telephone systems at interior posts, the operation of the general telegraph and cable service of the army, and the efficiency of signaling apparatus and equipment furnished the line of the army, excluding fire-control equipment for the coast defenses. This division endeavors to keep in touch with the line of the army and to cooperate with it in increasing the efficiency of signaling apparatus. The division receives and acts upon all requisitions for supplies purchased from signal-service appropriations. Daily reports are received showing the property in stock at the various general supply depots, and the division is thus able to distribute the approved requisitions in the interests of economy.

LABORATORY AND INSTRUMENT SHOP.

The laboratory, while originally established for the purpose of making commercial tests in connection with the purchase of supplies, has through force of circumstances been given over very greatly to the fabrication of special apparatus which it has been found impractical to have manufactured commercially. The work of the laboratory during the period of development of the fire-control apparatus proved an invaluable asset in quickly determining the suitability of hundreds of new devices which had to be made up to fit peculiar conditions. With a very small number of employees (one instrument maker, one electrical assistant, one carpenter and packer, and two skilled laborers) it is believed that the volume of work done has been very exceptional.

In the past two years special attention has been given to devising wireless telegraph apparatus, it having been found impractical to secure commercially in this country any portable wireless telegraph apparatus which was at all suited to field conditions. In addition to the portable apparatus devised, 45 sets have been assembled and shipped from the laboratory during the past fifteen months. Other special constructions have been the fabrication of complete artificial line equipment for duplexing the Sitka-Valdez cable, wireless apparatus for a number of coast artillery and Alaskan stations, and wireless telegraph apparatus for transports.

It would be difficult to estimate the money value of the work which the laboratory has been able to accomplish, and it is believed that it has returned many times over to the Government its cost to the Signal Corps.

III. STANDARD FIRE-CONTROL INSTALLATIONS FOR COAST DEFENSE.

In addition to the field work of the Signal Corps in the installation of apparatus in the various artillery districts during the year, considerable experimental work has been carried on in connection with the perfection of standard fire-control apparatus and the development of new equipment. In general the aim of such work has been to secure ideal operation and simplified design of circuits with reduced cost rather than to introduce radical changes in the present types of equipment.

An important change has been made during the year in the method of conducting the installation of standard fire-control systems by the organization of a board of officers in each artillery district in which this work is in progress.

These boards are composed of the representatives of the engineer, artillery, and signal corps, and are generally known as local fire-control boards. The functions of these boards are to consider the special adaptations of standard or typical fire-control schemes to meet the peculiar local conditions obtaining at each post. This board makes recommendations for such changes in the instruments, electrical connections, or operating requirements as in its judgment are desirable. The services of these boards have been of much value in securing prompt and efficient coordination of the work of the interested corps.

A brief outline of the year's work is given below:

(1) ARTILLERY DISTRICT OF PORTLAND.

During the year much work has been done at Forts Williams, McKinley, Levett, and Lyon, and the installations at those forts are nearing completion. The work of the Signal Corps at Peaks Island and Long Island is under way.

(2) ARTILLERY DISTRICT OF BOSTON.

The standard fire-control installations at Fort Banks, Fort Andrews, Fort Standish, Strawberry Hill, Fort Strong, and Nahant were completed during the year and transferred to the Artillery Corps. The work at Point Allerton and Deer Island was near completion at the close of the fiscal year.

(3) ARTILLERY DISTRICT OF PUGET SOUND.

At the close of the fiscal year the standard installations at Forts Worden and Flagler were nearing completion, while that at Fort Casey was about half completed.

(4) ARTILLERY DISTRICT OF SAN FRANCISCO.

Active operations have commenced on the installation of the fire-control system for this district. The preliminary engineering has largely been completed and much of the equipment delivered. Conditions are favorable for making rapid progress with this large and important work.

(5) IN OTHER ARTILLERY DISTRICTS.

The signal-corps installations in the standard systems at Forts Wadsworth and Hamilton, which were completed in 1906, have continued to give satisfactory results during the present year. During the year the post telephone systems at Forts Wadsworth and Hamilton were completed and transferred to the Artillery Corps.

The fire-control installation at Fort Morgan and the mine-fire installations at Forts Taylor, Pickens, Dade, Moultrie, Screven, Fremont, and Caswell are rapidly approaching completion. These systems are provisional in character.

Plans for the standard installations at the posts in the artillery district of the Columbia have been approved, and material is being shipped to those points.

(6) INSULAR INSTALLATIONS.

Plans for the signal-corps portions of the fire-control systems for Manila Bay and Hawaii have been approved, and material is being shipped to those points.

CABLE SHIP FOR FIRE-CONTROL WORK.

The past fiscal year has clearly demonstrated the imperative need for at least two cable ships for service on the Atlantic coast. In many cases submarine cables have been out of service for periods of several months, due to the large amount of work devolving upon the single vessel available for making repairs. It is anticipated that, with the addition of the cable ship now under construction, these conditions will be much improved. Repairs have also been delayed in some instances, due to the necessity for placing orders for cable to be used in making repairs. This will be obviated in the future by providing in each artillery district reserve lengths of cable which will be available at all times.

During the past year the cable boat has laid 18 new cables, repaired 28 interruptions, and recovered 7 cables which had been discontinued. There is now in commission slightly more than 2,000 conductor miles in 212 linear miles of submarine cable, largely in the Department of the East.

IV. WIRELESS TELEGRAPHY AND TELEPHONY.

WIRELESS TELEGRAPHY.

During the past few years the Signal Corps has given considerable attention to the development of suitable apparatus for the operation of wireless telegraphy, both for fixed stations and for use of the mobile army. This work has reached a point at present where suitable portable apparatus, including antennæ, has been standardized and issued in considerable quantities to the service schools, the recently organized field companies of signal troops, and to certain points for the use of coast artillery troops in connection with coast defense.

To summarize, the following table exhibits the classification and distribution of these stations at present:

Signal Corps wireless telegraph stations.

Station.	Power.	Height of mast.	Call.	Station.	Power.	Height of mast.	Call.
	<i>Kilo-watt.</i>	<i>Feet.</i>				<i>Kilo-watt.</i>	<i>Feet.</i>
Fort H. G. Wright, N. Y. .	1	150	FW	St. Michael, Alaska	3	200	FM
Fort Totten, N. Y.	3	125	FT	Petersburg, Alaska	1	100	FP
Fort Wood, N. Y.	3	150	FD	Wrangell, Alaska	1	100	FW
Fort Hancock, N. J.	1	117	FN	Camp Columbia, Cuba....	1	110	SO
Fort Omaha, Nebr.	3	175	FN	Zamboanga, P. I.	3	175	FM
Fort Leavenworth, Kans.	1	90	FL	Jolo, P. I.	3	175	FS
Nome, Alaska.	10	200	FD	Transport Logan.	3	.....	ATL
Fort Gibbon, Alaska.	10	200	FG	Transport Sherman.	3	.....	ATR
Fairbanks, Alaska.	3	175	FB	Transport Thomas.	3	.....	ATU
Circle City, Alaska.	3	175	FK	Transport Sheridan.	3	.....	ATS
Fort Egbert, Alaska.	3	200	FQ	Transport Kilpatrick.	3	.....	ATK

The 1-kilowatt sets at Fort Leavenworth and Camp Columbia are wagon sets. In addition, there are field pack sets at the Artillery School, Fort Monroe, Va., and the Army Signal School, Fort Leavenworth, Kans.

The wireless telegraph equipments developed by the Signal Corps, with their type, kilowatt capacity, and power equipment, are as follows: Two-cabinet style pack set (now obsolete), one-eighth; storage battery, gasoline engine, direct-current generator, hand generator. Trunk type pack set, one-eighth; storage battery, gasoline engine, direct-current generator, hand generator. Wagon set, 1; gasoline engine and alternating-current generator, belted. District signal station set, 1; alternating-current motor generator. Station set, Fort Wood, 3; alternating-current motor generator and belted engine set. Marine set, 3; alternating-current motor generator. Alaskan Signal Corps, 3; alternating-current generator belted to gasoline engine. Alaskan Massie, 10; alternating-current generator belted to gas engine.

Each field company has been issued equipment for two complete portable stations, which can be installed ready for operation in a very few minutes. The experience thus far in the utilization of portable wireless sets for the mobile army clearly indicates that, whereas the sets are extremely valuable at times, the main reliance for the service of lines of information between the larger units of a command must be upon the field buzzer lines which have been developed to a point where they are so mobile and reliable in operation as to inspire the confidence of the line of the army which they are designed to serve.

NEW ALASKAN WIRELESS INSTALLATIONS.

The most important wireless undertaking during the current year has been the construction and installation of a chain of stations along the Yukon River in Alaska. This work was inaugurated in January and carried forward simultaneously, so that the shipments could be made in a manner permitting all of the stations to go up at

the same time and to be finished, if possible, in the very short working season available in that Territory. The task included the design and construction of permanent and commodious houses for each of these stations, capable of accommodating duplicate generating apparatus for each plant, and serving also as an operating room and living quarters for the signal corps detachment on duty as operators. The antennae for these stations are to be supported from steel towers constructed in the United States and shipped in parts to Alaska, there to be erected, and are of the umbrella type, which has been found most efficient for this purpose.

This series of stations comprises the following: A new 10-kilowatt station at Nome, a 10-kilowatt station at Fort Gibbon, and 3-kilowatt stations at Fairbanks, Circle, and Fort Egbert. The steel towers for the stations at Fairbanks and Circle had been erected the previous year, and all of the other construction and the installation of the apparatus is now nearing completion as a part of the work of the present season.

In conjunction with this series of stations down the Yukon River the Signal Corps of the Army, in cooperation with the Navy Department, proposes to provide a complete chain of wireless stations leading from the mainland of the United States to Nome, on Norton Sound. To this end the Navy Department is at present constructing a high-power station near Valdez, Alaska, which when completed should be able to connect with the Signal Corps stations at Fort Egbert, Circle, Fairbanks, and Fort Gibbon on the north and with the large naval station at Sitka on the south, and from thence to the naval station at Tatoosh Island, off the coast of the State of Washington.

This wireless undertaking is far-reaching in its ultimate results and will furnish a complete telegraph system reaching the principal points in Alaska, thus duplicating the present land line and cable system, so that the chances of interruption which are now dependent upon a single cable and telegraph line will be very materially reduced and the certainty of communication at all seasons to the interior of Alaska assured. In addition to the main object of this wireless system, its completion will also enable certain readjustments of the land telegraph system heretofore employed which will very materially reduce the burden of maintenance through the long winter season on certain portions of the line.

WIRELESS TELEPHONY.

During the year progress in wireless telephony has reached a point where its adaptability to the uses of the army must be seriously considered. Through an allotment from the Board of Ordnance and Fortification this office has purchased one complete set of wireless-telephone apparatus, which has been installed at Fort Monroe, Va., and is now being tested under the supervision of the artillery school authorities.

From a theoretical standpoint it appears that the ultimate possibilities of wireless telephony are encouraging, and this office is at present considering plans for experimenting on this subject with a view of reducing the cost of the apparatus and increasing its efficiency.

NEED OF GOVERNMENT CONTROL OF WIRELESS TELEGRAPHY.

Wireless telegraphy, from a government standpoint, particularly along the coast line, is in a state of great confusion, due to the lack of proper regulations governing the interference of different private companies and the government stations. At present there is no definite regulation which prevents any commercial concern from maliciously operating its wireless plant to the confusion of the other stations within its range. The technical methods employed to prevent interference are not at present required by law, and the rapid increase in the number of stations has resulted in practically placing at the mercy of commercial concerns the operation of the government plants connected with the standard fire-control systems of the coast defenses.

It is evident that some form of government control is absolutely necessary in order to conserve the interests of the Government as well as of private parties.

V. MILITARY AERONAUTICS.

The past year has proved an epoch-making one in the progress of practical aeronautics, while at the present moment results are being obtained so rapidly as to convince any serious mind that the age of mechanical flight is finally at hand.

CURRENT EVENTS.

St. Louis races.—The balloon detachment of the Signal Corps, consisting of ten enlisted men, was on duty at the international balloon races in St. Louis in October, 1907. Their assistance was of great value to those in charge of the races; the knowledge that the men obtained was of great value to the Signal Corps.

An officer of the Signal Corps was in one of the balloons and landed a short distance from this city, covering the distance of 726 miles from St. Louis in thirty-nine and one-half hours.

Investigations abroad.—An officer of the Signal Corps spent three months in France, England, Germany, and Belgium last fall inspecting and investigating the military aeronautical establishments of these countries.

Free ascensions.—A number of free ascensions have been made from Washington, D. C. These were utilized for experimenting with wireless telegraphy, with balloon photography, and for training the personnel of the balloon detachment. Wireless messages were successfully received in the balloon car from various altitudes between 300 and 3,000 feet from the wireless stations at both the navy-yard, Washington, D. C., and Annapolis, Md. It was proven conclusively that wireless messages can be received in the car of a free balloon.

Spherical balloons.—Two new spherical balloons of 540 cubic meters and 1,000 cubic meters capacity have recently been contracted for; the smaller one for captive balloon work and the other for free ascensions.

Contracts for dirigible balloons and aeroplanes.—The Signal Corps has been instrumental in materially advancing the progress of aerial

navigation by the encouragement it has given the owners and inventors of dirigible balloons and aeroplanes.

In January specifications were prepared in this office and proposals invited for a dirigible balloon capable of carrying two persons and designed to have a speed of 20 miles per hour. A bonus was offered for additional speed up to 24 miles and a deduction from the contract price for speeds under 20 miles an hour. Below 16 miles, the machine to be rejected. An endurance test of two hours was prescribed, during which time the machine was to make 70 per cent of its maximum speed. The instruction of two men in handling and operating the airship was included in the contract price. Thirteen bids were received in answer to these specifications and the contract was awarded to Mr. Thomas S. Baldwin, of New York City, who is to deliver his airship at Fort Myer, Va., by July 27. He is given one month after delivery in which to fulfill the requirements of the specifications.

In December specifications were sent out covering the purchase of a heavier-than-air flying machine. In this case the speed was fixed at 40 miles an hour. An endurance test of one hour was prescribed, during which time the machine was required to remain continuously in the air without landing; to be steered in all directions without difficulty and at all times under control and equilibrium. This machine was also required to carry two persons and the purchase price was to include the instruction of two men in its handling and operation. Twenty-four bids were received and contracts were awarded to two of the bidders, Mr. A. M. Herring, of New York City, and the Wright Brothers, of Dayton, Ohio. Mr. Herring has until August 13, and the Wright Brothers until August 28 to deliver their respective machines at Fort Myer, Va. A month will be allowed in which to complete the trials.

The requirements were made severe in both the dirigible and aeroplane. As a result, inventors are spurred on to produce machines which are in advance of anything yet made; at the same time the Government will not have to purchase an experimental and useless device, but will secure equipment of immediate and real military value.

Tent or hangar.—A tent 110 feet long has been ordered which is to house the dirigible balloon and aeroplanes at maneuvers or wherever it may be decided to use them.

Captive-balloon park.—The captive balloon, which up to within a few years was the only practical one for military purposes, still holds an important place as a portable means of observation. Plans have been prepared for a field captive-balloon park consisting of the necessary special type vehicles for carrying the balloon, hydrogen tubes from which to fill it, and power winch for raising and lowering it on its cable.

The important question of supplying hydrogen gas in the field has been settled after careful consideration by providing steel tubes in which the gas is compressed to a high degree at the source of supply. These tubes can then be transported into the field by rail and by the special type of wagons mentioned above. Three hundred and sixty-eight of these cylinders are now on hand; steps are being taken to increase this number so that it will be possible to supply hydrogen anywhere and in any desired quantity.

Balloon plant at Fort Omaha.—In anticipation of taking up the subject of aeronautics on a scale commensurate with its importance, a complete plant is being constructed at Fort Omaha, Nebr. This plant comprises a steel balloon house 200 feet long, 84 feet wide, and 75 feet high; that is, large enough to house a dirigible balloon the size of the new French military airship *Le Republique*. For furnishing hydrogen gas, an electrolytic plant is being set up capable of furnishing 3,000 cubic feet per hour. A gasometer of 50,000 cubic feet is being provided to store a sufficient amount for emergencies. In connection with the hydrogen plant is a compressor for charging the steel tubes referred to above when it is desired to ship hydrogen to other points. A hydraulic pump for testing steel tubes at high pressure is a part of this equipment. A wireless-telegraph tower 200 feet high has been completed and will probably be used in connection with wireless experiments for balloons. This Fort Omaha plant will be completed about October 1, 1908.

DEVELOPMENT OF MILITARY AIR SHIPS ABROAD.

In the development of aerial navigation, two distinct general types of machines are being constructed, namely, the dirigible balloon, which consists essentially of a gas bag supporting a suitable car, comprising power to drive it through the air; and, secondly, all those other forms of machines which possess no gas bag, but depend for suspension upon the dynamic reaction of the atmosphere. The machines of the latter class are heavier than air.

France, Germany, and England have, in the past few years, displayed unusual activity and interest in the development of airships for military purposes.

France.—France has just received from the builders her fourth large air ship, *La Republique*. Her predecessor, *Le Patrie*, 198 feet long, greatest diameter 34 feet, engines 70 horsepower, and capable of a maximum speed of 34 miles an hour, made 174 miles from Paris to its station on the German frontier in about seven hours. Another French dirigible, the *Ville de Paris*, has a length of 203 feet, greatest diameter 34 feet, engines 70 horsepower. It has made a successful flight of 140 miles and made a speed of 26 miles per hour. This air ship was taken over by the French army for station at Verdun in place of *Le Patrie*, which was lost.

England.—The British army constructed, from very limited funds, a small dirigible known as *Military Dirigible No. 1*. It has made successful flights. As a result of the preliminary experiments the aeronautical department now has under construction at Aldershot *Military Dirigible No. 2*, having engines of 100 horsepower and designed for a speed of 40 miles per hour. It will carry 6 passengers. Experiments with heavier-than-air flying machines are being conducted by the aeronautical corps.

Germany.—The aeronautical corps of the German army has just put into operation its second dirigible balloon. Two others are operated under government patronage, the *Parseval* and the *Zeppelein*. The latter has a length of 446 feet, diameter 42 $\frac{1}{2}$ feet, two engines of 110 horsepower each, and has completed within a few days a 250-mile trip lasting twelve hours, on which it went over the Alps from Lake Constance to Zurich and Lake Lucerne and back to the

starting point, carrying 12 persons. It is now preparing for a twenty-four-hour endurance test, on which a run is to be made from Lake Constance to Mainz and return.

Russia.—The Russian army is now taking steps to construct several dirigible balloons of the *Patrie* type. Their present estimates contemplate the construction of a fleet of four dirigibles of that size and type.

Belgium.—Reports indicate that the Belgian army has contracted recently with an aeronautical constructor in Paris to furnish a high-speed military dirigible.

Italy.—Reports indicate that the aeronautical department of the Italian army is experimenting with a high-speed military dirigible balloon.

ACTION OF THE HAGUE PEACE CONFERENCE.

The following is the declaration signed by the delegates of the United States to the Second International Peace Conference held at The Hague June 15 to October 18, 1907, prohibiting the discharge of projectiles and explosives from balloons, ratified March 10, 1908:

The undersigned, plenipotentiaries of the powers invited to the Second International Peace Conference at The Hague, duly authorized to that effect by their Governments, inspired by the sentiments which found expression in the declaration of St. Petersburg of the 29th of November (11th of December), 1868, and being desirous of renewing the declaration of The Hague of the 29th of July, 1899, which has now expired,

Declare:

The contracting powers agree to prohibit, for a period extending to the close of the Third Peace Conference, the discharge of projectiles and explosives from balloons or by any other new methods of a similar nature.

The present declaration is only binding on the contracting powers in case of war between two or more of them.

It shall cease to be binding from the time when, in a war between the contracting powers, one of the belligerents is joined by a noncontracting power.

The present declaration shall be ratified as soon as possible.

The ratifications shall be deposited at The Hague.

A procès-verbal shall be drawn up recording the receipt of the ratifications, of which a duly certified copy shall be sent, through the diplomatic channel, to all the contracting powers.

Nonsignatory powers may adhere to the present declaration. To do so, they must make known their adhesion to the contracting powers by means of a written notification, addressed to the Netherlands Government, and communicated by it to all the other contracting powers.

In the event of one of the high contracting parties denouncing the present declaration, such denunciation shall not take effect until a year after the notification made in writing to the Netherlands Government, and forthwith communicated by it to all the other contracting powers.

This denunciation shall only have effect in regard to the notifying power.

In faith whereof the plenipotentiaries have appended their signatures to the present declaration.

Done at the Hague, the 18th October, 1907, in a single copy, which shall remain deposited in the archives of the Netherlands Government, and duly certified copies of which shall be sent through the diplomatic channel to the contracting powers.

The countries which did not sign the declaration forbidding the launching of projectiles or explosives from balloons were: Germany, Austria-Hungary, China, Denmark, Ecuador, Spain, France, Great Britain, Guatemala, Italy, Japan, Mexico, Montenegro, Nicaragua, Paraguay, Roumania, Russia, Servia, Sweden, Switzerland, Turkey, Venezuela.

As an evidence of the attention which is now being given by foreign armies to the subject of military aeronautics, a schedule of troops at present used exclusively for aeronautical work by the principal foreign powers follows:

Balloon troops.

	Peace.		War.		Student classes.		
	Officers.	Men.	Officers.	Men.	Months each year.	Officers.	Men.
England (1 company; factory and school at Aldershot).....	5	40	20	306	.....	15	.....
France (battalion of 4 companies; factory and experimental station at Meudon).....	24	432	.....	.....	.....	.....	.....
Germany (battalion of 3 companies; headquarters and school at Tegel).....	20	465	.....	.....	.....	20	.....
Russia (3 battalions).....	79	3,255	79	3,255	8	.....	.....
Italy	5	80	22	628	.....	.....	.....
Austria	15	186	.....	.....	6	20	320
Spain.....	9	104	.....	.....	.....	.....	.....

The United States has at present a force of 3 officers and 10 enlisted men to compare with the above figures.

With the approval of the Secretary of War, an estimate for \$200,000 was submitted to Congress at its last session to make a beginning in the subject of the proper aeronautical equipment and instruction for the American army. This appropriation, however, failed to be authorized, which fact placed this office at a disadvantage at a critical time. The Board of Ordnance and Fortification, however, has taken up this subject, and from the limited appropriation available for that board has allotted the funds, which made it possible to enter into contracts for the purchase of one each of the Wright Brothers and Herring aeroplanes. Progress in aeronautics has been rapid in the past few months and may be expected to be more so in the near future. The Wright Brothers have not as yet given a public demonstration of their aeroplane. In October, 1906, Santos Dumont made the first public flight, a bound of a few yards. The following year Farman, a French aeronaut, increased this to a couple of hundred yards; then in January made 1 mile, returning to the starting point. Since then he has progressively increased this distance to 8 miles, time in the air about twenty minutes.

A single modern battle ship of the *Connecticut* type costs approximately \$8,000,000, and the present naval policy of gradually increasing the number of battle ships is strictly in accord with the present needs of the nation. To enable the Signal Corps of the Army to initiate and develop an aeronautical service for the army, an estimate will be submitted to Congress at its coming session for a sum which will enable the Signal Corps to take up this rapidly rising military auxiliary in a manner commensurate with its intrinsic importance and worthy of the present prominence of the nation.

Very respectfully,

JAMES ALLEN,
Brigadier-General,
Chief Signal Officer of the Army.

The SECRETARY OF WAR.

NOTE.

WAR DEPARTMENT,

SIGNAL OFFICE,

Washington, October 31, 1908.

Since the completion of this report the entire chain of wireless telegraph stations under installation in Alaska has been successfully completed and is at present handling commercial traffic.

In military aeronautics, the contract for the purchase of one dirigible balloon has been fulfilled, and the balloon tested and accepted, and is at present used for the training of officers and men. The contract with the Wright Brothers for a heavier-than-air flying machine has not yet been completely fulfilled, due to the deplorable accident that resulted in the death of Lieut. Thomas E. Selfridge, First Field Artillery, attached to the Signal Corps, and the serious injury of Mr. Orville Wright, of Dayton, Ohio, on September 17, 1908. The preliminary tests of the aeroplane at Fort Myer, Va., have publicly demonstrated, however, the practicability of mechanical flight.

J. A.

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U. S. SIGNAL CORPS
TELEGRAPH AND CABLE SYSTEM
IN
ALASKA
AND
U. S. CABLES AND CANADIAN LINE
CONNECTING WITH THE UNITED STATES

PREPARED UNDER THE DIRECTION OF
BRIGADIER-GENERAL JAMES ALLEN
CHIEF SIGNAL OFFICER, U. S. ARMY

JULY, 1908

Statute Miles

20 40 60 80 100 120 140 160 180

LEGEND

Telegraph Office

Town or Station

U. S. Post Office

Post and Telegraph

Wireless Station

STATIONS AND DISTANCES.

LAND LINES

Name-Valdez Section

Intermediate Miles

Total Miles

Miles Miles

Seattle 0 0

Sitka 106 106

Valdez 659 1684

Port Liseum 4 24

Seward 188 1877

McNeil Island 166

Unalaska 30 188

Old Woman 50 245

Kaltag 45 291

Nome 40 233

Koyukuk 30 381

Louden 50 411

Melezi 35 446

McNeil 35 446

Birches 40 524

Fort Gibon 55 579

Rapids 24 603

Rand 23 620

Glen 35 661

Hot Springs 21 682

Tolovana 37 719

Minot 39 725

Chena 35 783

Fairbanks 28 822

Delta 37 863

Delta 29 888

Richardson 2 900

McCarty 20 909

Douglas 40 920

McCallum 37 987

Paxson 18 1015

Gulkana 23 1044

Gulkana 37 1071

Copper Center 26 1107

Tonsina 26 1132

Teekhell 24 1150

East Fork 24 1160

Thompson Pass 5 1185

Worthmans 7 1192

Valdez 19 1211

Total 1062

Fort Egbert Branch

Gulkana 0 1211

McNeil 50 1251

Chitochin 20 1251

Mentasta 46 1297

Tanana Crossing 51 1348

Kuskokwim 52 1406

North Fork 18 1423

Fort Egbert 68 1490

Boundary 12 1503

Land Lines 1595

Wireless 1062

Cables 2592

5049

WIRELESS

Egbert Circle 162

Circle Fairbanks 150

Circle-Obukh 150

Gibson-Nome 390

Nome-St. Michael 131

Petersburg-Wrangell 49

Total 1062

